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ECONOMIC AND ECONOMETRIC ANALYSIS OF FOOD DEMAND IN IRAQ: A STUDY OF CONSUMER BEHAVIOR FOR THE PERIOD 1990–2023

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Abstract: The objectives of this study will be: Analyzing the financial aspects of food demand in Iraq during the period (1990-2023), and providing an estimate of the quantity of food consumed in Iraq using the amount of dietary energy supply per capita in Iraq (kcal/person/day). The explanatory variables are the consumer price index, real GDP per capita and exchange rate and per capita food imports. The information collected were from two sources, which were the annual levels of FAOSTAT and World Development Indicators data source. The empirical procedure included the descriptive analysis, the Augmented Dickey–Fuller (ADF) and the Phillips–Perron (PP) unit-root tests, the bounds test for cointegration, the autoregressive distributed lag (ARDL) model representation, diagnostic and stability tests. We have decided that no series of I(2) variables but there are series of I(0) and I(1) variables. The best ARDL(3,2,2,1,1) model resulted an adjusted R-squared of 0.9727. The upper bound of the bounds-test F-statistic was 4.7614 which surpassed the F-statistic upper critical value at 1% level of significance, thus indicating the existence of a stable long-run relationship. The elasticity of food imports demand with respect to food imports demand per capita is significant at 5 per cent level for long run but the elasticity of the general price level with respect per capita food imports is not significant at 5 per cent level for long run.All of the long run elasticities of food demand are insignificant at 5 per cent except for the long run elasticity of food demand in terms of per capita food imports, which is 0.1267 and significant at 5 per cent level. This error correction coefficient is negative and significant (-0.3610) meaning that 36.1% of this short-run disequilibrium is corrected each year. The short run price elasticity computed using the food price index of FAO has a result of -0.1870 which is significant at 10% level. Results revealed that Iraq is heavily relying on food imports in the long term and the necessity to apply policy for boosting food production, forestry stocks and diversification of food sources to survival the surge in food prices by vulnerable consumers.

Keywords: Food demand, Consumer behaviour, ARDL, Cointegration technique, food imports, Iraq.

Introduction

Food demand study is very closely related with study of consumer behaviour and changes in income, price and population and hence it is a very important study of microeconomics. Food commodities are a significant part of consumption expenditure especially in an economy that is prone to price and income fluctuation. The analysis of food demand is of particular importance in Iraq because of the economic changes the country has undergone over 1990-2023 and the associated changes in real incomes, inflation rates and exchange rates as well as the change in consumer spending patterns.

Iraq's economy has been fluctuant over the last few decades, affecting consumers' access to food commodities. The Iraqi economy is still highly dependent on the oil-based economy for economic activities, and fluctuations in the exchange rate and fluctuations in international markets have an impact on the domestic markets, especially in the food sector, according to the World Bank [1, p. 9]. The same report also stated that Iraq's dependence on imported essential products increases food and transport prices' sensitivity to exchange rate fluctuations and inflation [1, p. 9].

The inflation rate has been decreasing relatively in the recent years; it was approximately 2.6% in 2024 and approximately 4.4% in 2023 according to Central Bank of Iraq data. The consumer price index (CPI) was re-based on a new base year 2022=100 due to changes in the weights of the consumer basket caused by the changes in consumption and expenditure behavior [2].

Another driver of pressures on aggregate food demand is continued population growth in Iraq. Iraq is estimated to have a population growth rate of approximately 2.4% per year, which will place further pressure on the need to enhance food and agricultural policies in Iraq, as the population continues to increase and put pressure on essential food commodities [1, p. 5].

The Food and Agriculture Organization of the United Nations (FAO) also reports that the FAOSTAT databases contain detailed information concerning food and agricultural production, consumption and trade. By making FAOSTAT an important data source for building time series of food-demand variables in Iraq, especially food availability, consumption, imports and domestic production, it becomes useful for achieving this goal [3].

The research problem is that the prices and income are not the only factors that determine the demand for food in Iraq, but also the economic crisis, climatic crisis, political crisis, food imports and changes in the size of the Iraqi population, etc. The use of time series models to analyse this demand is then useful to measure its price and income elasticities and to study short run and long run relationships between food consumption and its economic determinants.

This study, therefore, is interested in exploring and analysing the food demand in Iraq during the period 1990- 2023, and also in correlating the quantitative measure of food demand with the food availability per capita, using as an indicator the CPI food, real GDP per capita, exchange rate and food imports per capita. The objective is to explain consumers' behaviour and to approximate the short-run and long-run elasticities.

Research Problem

Food is one of big items of Iraqi consumer expenditure and food commodities constitute a considerable percentage of the consumption expenditure of households. But, in recent decades, a few economic variables have impacted demand for food, most notably income, inflation, exchange rate, food prices and fast population growth. Iraq's dependence on a number of vital food commodities has made it more prone to price fluctuations in the

international markets, impacting the consumer's purchasing power as well as his consumption patterns.

The subject is important but the studies on food-demand behavior in the light of modern time-series models are limited especially for short and long-term relationships between food demand and its economic determinants (prices and incomes), and for estimating the price and income elasticity in Iraq. Then the main question is made as the problem of the study, which is:

What are the effects of general price level, real income per capita, exchange rate and food imports per capita on food demand in Iraq in the period (1990-2023) and what is the relationship between them in the short and long periods of time?

Importance of the Research

First: Scientific Importance

The study is a contribution to the enrichment of the Iraqi economic literature with the modern economometric study of the demand in the field of demand economics using time series data.

Improves estimation of price and income elasticities of food demand in order to enhance understanding of Iraqi consumers' behavior.

It uses the latest econometric models including autoregressive distributed lag (ARDL) model to explore the short and long-run relationships.

It helped to develop the theory of microeconomics particularly the theory of consumer behaviour and demand theory.

Second: Applied Importance

Giving indicators to assist in formulating food policies.

Assisting food-security programs in Iraq.

Supporting the improvement of pricing policies.

Assisting in the decisions regarding imports and production of food commodities at home.

Providing findings that can be used in preparing development plans and agricultural and trade policies.

Research Objectives

Main Objective

To examine and quantify the impact of economic indicators on the food demand in Iraq in 1990-2023.

Sub-objectives

To study the trends in food demand history in Iraq.

To analyse the change in the demand for food: consumer price index, real income per capita, exchange rate, food imports per capita.

To approximate the econometric relationship between food demand and the economic variables.

To measure the price elasticity and income elasticity of demand.

To test the short and long run relationships with the ARDL model.

To make recommendations that help to increase the efficiency of food policies.

Research Hypotheses

Main Hypothesis

The relationship between food demand in Iraq and the explanatory economic variables is statistically significant during the study period.

Sub-hypotheses

Increased general price level will adversely affect the demand for real food.

The food demand has positive and significant relationship with real income.
per capita food imports positively influence per capita food availability.
The exchange rate has a statistically significant impact on food demand due to its pass-through into the prices of commodities that are imported into the country.
There is a negative and statistically significant error-correction mechanism, which brings the food demand back to the long run equilibrium after short run shocks.

Materials and Method

Descriptive approach was used to analyze the development of variables while econometric approach was carried out using the double-logarithmic autoregressive distributed lag (ARDL) model. The ADF test [4] and the PP test [5] were carried out after which the long-run coefficients were estimated, the error-correction model and diagnostic tests were carried out.

Data Sources

The study used time series secondary data for the period 1990–2023 that was readily available. In 2023, the official food balance sheets, released by FAOSTAT, did not contain the value of the dependent variable for the years 2024 and 2025, which made it impossible to continue the estimation for the next two years.
Iraq Central Statistical Organization (Annual Statistical Abstract).
Ministry of Planning – Iraq.
Central Bank of Iraq (annual reports and monetary policy reports).
Iraq Energy Outlook Report (BP).
Food and Agriculture Organization of the United Nations (FAOSTAT).
International Monetary Fund (International Financial Statistics).
Appropriate Arabic and international studies and research.

Theoretical Framework

First: The Concept of Food Demand

Food demand is an elementary term of microeconomics. It involves the quantities of food commodities which consumers can afford and desire to purchase at different prices over a period of time (ceteris paribus). The concept that when the price of a commodity rises the quantity demanded will decrease, and when the price of a commodity falls the quantity demanded will increase is based on law of demand. This law provides a foundation for the understanding of consumers' behaviour and economic choices [6].
The demand for food can be expressed in the form of a functional relationship between quantities of food commodities demanded and a number of economic and social variables like food prices, income, prices of substitute and complementary commodities, tastes and consumption behaviour. The effects that these have on consumers depend on the type of commodity and the individual income level [7].
The study of food demand is of special importance since food is one of the indispensable necessities of life. The percentage of income spent on food is substantial, especially in developing countries as it's greater than in developed countries [8, pp. 104–109].

Second: Factors influencing Food Demand

There are several economic and demographic influences that can influence consumer choices and thus the food demand. The most relevant:
1. Food Prices
The most important factor that changes the demand is the price. According to the law of demand [9, pp. 64–66], the quantities demanded of a product decrease as the price of the

product increases and increase as the price of the product decreases, holding all other factors constant.

2. Income

One of the most significant factors affecting food demand are consumer income. As income increases, purchasing power increases, which leads to a rise in demand for most food commodities—higher quality goods in particular, and possibly to a fall in demand for inferior goods—when income increases [6].

3. Population

There are two ways in which population growth will increase aggregate food demand: firstly, by increasing the number of people who will eat food, and secondly, by increasing the demand for food. This includes having increased domestic production or importing more to meet food needs, and population is one of the most important factors in food-demand modelling [3].

4. Inflation

As the price level rises, people's purchasing power decreases and their spending on food and their consumption of food products change, especially for the poor, who tend to replace food products that are more expensive with less expensive ones [1, pp. 9–11].

5. Exchange Rate

Depreciation of the domestic currency increases the cost of imported food in economies where food is a commodity that is imported. This has a negative impact on the quantity demanded and food consumption behaviour [10, p. 8].

Third: Consumer behavior theory

Consumer behaviour theory is based on the assumption that consumers try to maximise utility for the quantity of goods and services they consume within the limits of their income. Then, the consumer distributes his or her money among the purchases of a number of commodities to get the greatest satisfaction from the products. This kind of behavior will rely on commodity prices, the level of income and individual tastes and preferences [6].

According to the theory of utility, the customer will continue to consume a product until the MU of each product is equal to the price of the product per dollar spent in the product called the consumer's equilibrium [8, pp. 89–91].

Indifference-curve theory also implies that the consumer will be at equilibrium at the point where an indifference curve touches the budget line, i.e., at the point where the consumer gets the maximum possible utility with a given amount of income. This theory is one of the most important theories that explains the demand for food [7].

Fourth :Food Demand in Iraq

With an increase in population, fluctuation in oil prices, inflation, changes in exchange rates and the importance of food imports in Iraq's consumption, the demand for food has undergone great changes over the last few decades. All these have resulted in food demand being more sensitive to economic shocks and fluctuations at the local, regional and global levels [1, pp. 9–14].

The rise in some years' incomes also affected the consumption of food products, and the raise of prices and inflation in other years reduced the purchasing power of the households, leading to substitution for lower cost products. This highlights the importance of applying the most up-to-date econometric methods in analyzing the factors affecting food demand, which would help to precisely estimate the price and income elasticities for Iraq's food and economic policy decisions. FAOSTAT provides the underlying food-supply series [3]. The Central Bank of Iraq documents recent changes in the consumer price index [2].

Results and Discussion

Practical Part: Econometric Estimation of Food Demand in Iraq for the Period 1990–2023

First: Database Description and Statistical Processing

Thirty-four observations were performed per year for the analysis. Y was per capita daily dietary energy supply (kcal/person/day). This indicator is more closely related to qualitative consumption than nominal food expenditure which no homogeneous series exists for it in Iraq. Demand was not included in the equation because it was given per capita and thus was not mechanical. The inflation rate was also not used along with the price index in the same equation due to the fact that the inflation rate is the rate of change of the price index.

Table 1. Definition and Sources of the Econometric Model Variables

Symbol	Variable definition	Unit	Type	Source
LFOOD_PC	Logarithm of per capita dietary energy supply	kcal/person/day	Dependent	FAOSTAT
LCPI	Logarithm of the consumer price index	2010=100	Independent	WDI
LRGDP_PC	Logarithm of real GDP per capita	Constant 2015 US$/person	Independent	WDI
LEXR	Logarithm of the alternative exchange-rate conversion factor	IQD/US$	Independent	WDI
LFIMP_PC	Logarithm of food imports per capita	kg/person	Independent	FAOSTAT and WDI

Source: Prepared by the author based on the study data and econometric outputs. The food indicators were drawn from FAOSTAT [3]. The macroeconomic and population series were drawn from World Development Indicators [11].

Food balance sheets have been used to prepare the food-availability series, which were available through 2013 and for 2010–2023 were prepared using the new methodology [12]. All the difference in level between the two methodologies was eliminated by linking the series by the geometric mean of the ratio of the new series to the historical series in the years of overlap (2010–2013), which gave a linkage factor of 1.033294. The same procedure was repeated with the amount of food imports, but this time with a factor of 1.060221. The estimation database for 2024 and 2025 do not contain any imputation or forecasting.

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Second: Descriptive Analysis of the Study Variables

Table 2. Descriptive Statistics of the Study Variables

Variable	Mean	Median	Maximum	Minimum	Std. deviation
Food availability per capita	2496.24	2455.62	3357.17	2167.85	228.90
Consumer price index	67.61	85.62	139.52	0.03	50.84
Real income per capita	3572.89	3774.98	4932.93	1254.63	1024.49
Alternative exchange rate	1017.63	1170.00	1468.76	0.31	409.62
Food imports per capita	274.12	285.68	497.35	83.98	104.10

Source: Prepared by the author based on the study data and econometric outputs.

The per capita energy supply would average at about 2496.2 kcal per day, with a minimum of about 2167.9 kcal and a maximum of about 3357.2 kcal. The low point in the 1990's was due to the Gulf War and the sanctions, and the recovery period began slowly since 2004, with the indicator reaching 2.763.8 kcal in 2023. In parallel, the per capita imports of food have also increased in the last several years and have become more dependent on imported food supplies.

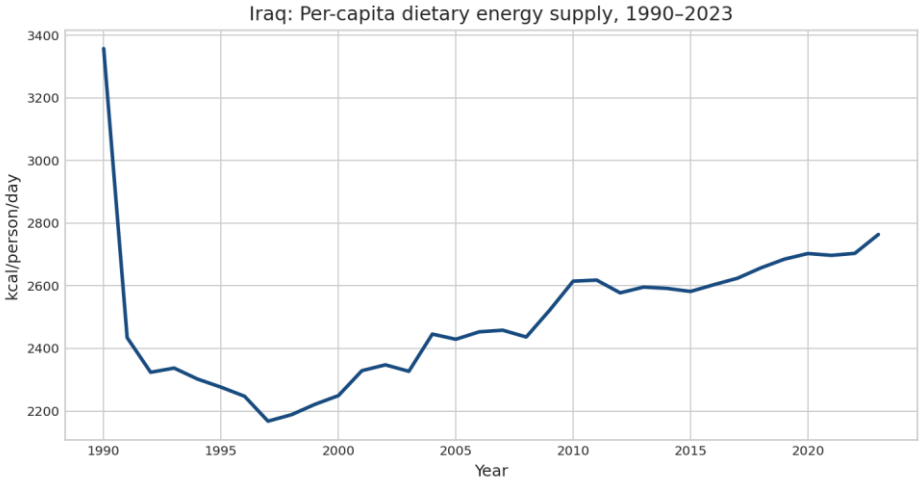


Figure 1. Per Capita Dietary Energy Supply in Iraq, 1990–2023

Third: Unit-Root Tests for the Time Series

The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests were used with an intercept, and the lag length of the ADF test for the intercept was determined by the Akaike information criterion [13]. All series were both stationary I(0) stationary and I(1) stationary. No variable of order two which means the principal condition for applying ARDL technique was satisfied.

Table 3. ADF and PP Unit-Root Test Results

Variable	ADF at level	PP at level	ADF at first difference	PP at first difference	Order
LFOOD_PC	-4.055***	-4.593***	-16.358***	-21.113***	I(0)
LCPI	-5.540***	-13.478***	-2.871**	-2.614*	I(0)
LRGDP_PC	-1.890	-1.894	-10.543***	-11.510***	I(1)
LEXR	-8.504***	-12.648***	-50.741***	-26.372***	I(0)
LFIMP_PC	-1.427	-1.515	-7.743***	-10.225***	I(1)

Source: Prepared by the author based on the study data and econometric outputs.
Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Fourth: Selection of the Model Lag Order

Given the small annual sample, models with the maximum of 3 lags of the dependent variable and maximum of 2 lags of each of the explanatory variables were compared. ARDL(3,1,2,2,1) model was not rejected with the serial-correlation test and was the lowest in terms of minimum AIC but it was not the best model numerically. Therefore, the closest model that is a diagnostic improvement is the ARDL(3,2,2,1,1) and since all tests are significant at the 5% level, this model is chosen as the near diagnostic model.

Table 4. Comparison of the AIC-Preferred Model and the Selected Diagnostically Valid Model

Model	AIC	LM probability	Decision
ARDL(3,1,2,2,1)	-5.729	0.016	Rejected: serial correlation
ARDL(3,2,2,1,1)	-5.717	0.060	Selected: diagnostically valid

Source: Prepared by the author based on the study data and econometric outputs.

Fifth: ARDL Estimation Results

The following double-logarithmic model was estimated: ln(FOOD_PC)t = f[ln(CPI)t, ln(RGDP_PC)t, ln(EXR)t, ln(FIMP_PC)t]. The long-run coefficients are simply elasticities.

Table 5. ARDL(3,2,2,1,1) Estimation Results

Variable	Coefficient	Std. error	t	Prob.
C	2.4091**	0.8952	2.691	0.0155
LFOOD_PC(-1)	0.8538***	0.1635	5.223	0.0001
LFOOD_PC(-2)	-0.3702*	0.2108	-1.756	0.0970
LFOOD_PC(-3)	0.1555	0.1006	1.545	0.1407
LCPI	0.0219	0.0154	1.417	0.1745
LCPI(-1)	0.0003	0.0158	0.018	0.9861
LCPI(-2)	-0.0105	0.0106	-0.998	0.3324
LRGDP_PC	0.0452*	0.0252	1.790	0.0913
LRGDP_PC(-1)	-0.0843***	0.0280	-3.010	0.0079
LRGDP_PC(-2)	0.0563**	0.0209	2.690	0.0155
LEXR	0.0113	0.0506	0.224	0.8253
LEXR(-1)	-0.0156	0.0484	-0.322	0.7517
LFOOD_IMPORT_KG_PC	-0.0007	0.0205	-0.033	0.9742

Variable	Coefficient	Std. error	t	Prob.
LFOOD_IMPORT_KG_PC(-1)	0.0464**	0.0173	2.687	0.0156

Source: Prepared by the author based on the study data and econometric outputs.

The coefficient of determination was R^2=0.9845 and adjusted coefficient of determination was 0.9727. The model F statistic was significant at probability less than 0.01 and Durbin–Watson statistic was = 1.723. These indicators results are were supporting the explanatory power of the model, while the last indicator is still subjected to residual and stability test.

Sixth: Bounds Test for Cointegration

Table 6. Bounds Test for Cointegration

Significance level	Lower bound I(0)	Upper bound I(1)
10%	2.270	3.354
5%	2.637	3.791
1%	3.420	4.706

Source: Prepared by the author based on the study data and econometric outputs.

The probability at the upper bound value was 0.0090, and greater than the upper bound value of 0.0061, the calculated F-statistic was 4.7614, which was higher than 4.7061, the upper bound value. Therefore, the null hypothesis of no long run relationship between the food demand and the determinants of food demand is rejected, providing evidence of cointegration under the ARDL bounds-testing framework [14].

Seventh: Long-Run Estimates

Table 7. Long-Run Coefficients

Variable	Elasticity	Std. error	t	Prob.
LCPI	0.0321	0.0227	1.419	0.1741
LRGDP_PC	0.0476	0.0830	0.573	0.5739
LEXR	-0.0117	0.0590	-0.198	0.8451
LFIMP_PC	0.1267**	0.0571	2.217	0.0405

Source: Prepared by the author based on the study data and econometric outputs.

Elasticity of food imports per capita was 0.1267, significant at 5% level thus the per capita increase in food imports by 1% results to the increase of food availability by 0.127% per capita in the LR. Residual real income elasticity was positive and small (0.0476) but not statistically significant; this is consistent with food being a necessity, and with spending on income increases being directed more towards the quality and variety of food that is consumed, rather than an increase in total calories. The sign of the exchange-rate effect was negative (-0.0117) and this effect was not significant, whereas the effect of the general price level was positive (+) and small, but not significant. It can therefore not be regarded as a violation of the law of demand but as quantitative nature of an indicator, the function of Public Distribution System, subsidised prices and the absence of a food specific price index (which is a general price index).

Eighth: Short-Run Results and the Error-Correction Model

Table 8. Error-Correction Model and Short-Run Coefficients

Variable	Coefficient	Std. error	t	Prob.
D(LFOOD_PC(-1))	0.2147	0.1669	1.287	0.2154
D(LFOOD_PC(-2))	-0.1555	0.1006	-1.545	0.1407
D(LCPI)	0.0219	0.0154	1.417	0.1745
D(LCPI(-1))	0.0105	0.0106	0.998	0.3324
D(LRGDP_PC)	0.0452*	0.0252	1.790	0.0913
D(LRGDP_PC(-1))	-0.0563**	0.0209	-2.690	0.0155
D(LEXR)	0.0113	0.0506	0.224	0.8253
D(LFOOD_IMPORT_KG_PC)	-0.0007	0.0205	-0.033	0.9742
CointEq(-1)	-0.3610***	0.1041	-3.468	0.0029

Source: Prepared by the author based on the study data and econometric outputs.

The error-correction coefficient was negative and significant at the 1% level, indicating that the long run relationship is not affected. So, about 36.1% of disequilibrium is corrected in one year following a short-run shock and the approximate return to equilibrium occurs in 2.77 years. The contemporaneous impact of real income was positive and significant at 10% level, whereas the lagged impact was negative and significant at 5% level, indicating difference in the response of consumption to the initial shock and the subsequent reallocation of consumption.

Ninth: Diagnostic Tests and Model Stability

Table 9. Diagnostic Test Results

Test	Statistic	Prob.	Decision at 5%
Breusch-Godfrey LM (lag 2)	5.6187	0.0602	Fail to reject the null hypothesis
Breusch-Pagan-Godfrey	14.5889	0.3337	Fail to reject the null hypothesis
ARCH LM (lag 2)	3.2383	0.1981	Fail to reject the null hypothesis
Jarque-Bera	1.1208	0.5710	Fail to reject the null hypothesis
Ramsey RESET	0.1280	0.7252	Fail to reject the null hypothesis
CUSUM stability	0.4416	0.9899	Fail to reject the null hypothesis

Source: Prepared by the author based on the study data and econometric outputs.

The result for all the tests (serial-correlation, heteroskedasticity, ARCH, normality and RESET) is more than 5%, indicating that the model has no serious econometric problems and the model functional form is correct. Additionally from the CUSUM test [15], the path remained within the critical region and the probability of the stability-test was 0.9899, which suggested that the coefficients were stable.

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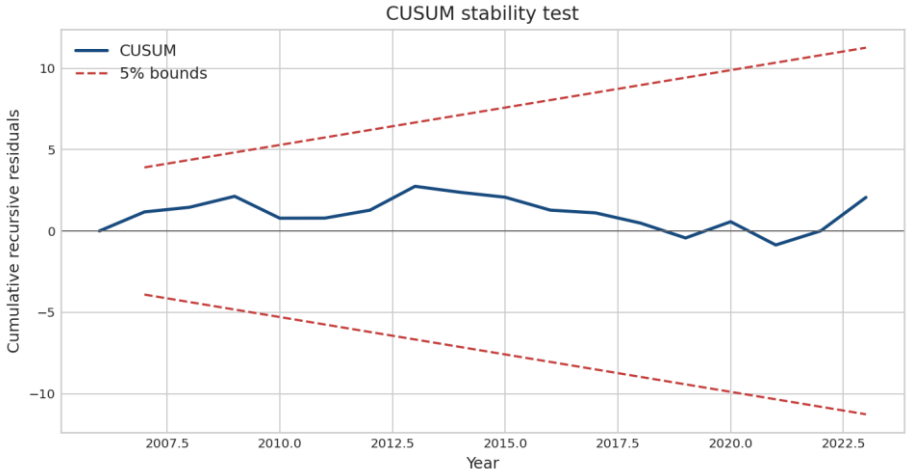


Figure 2. CUSUM Test for Model-Coefficient Stability

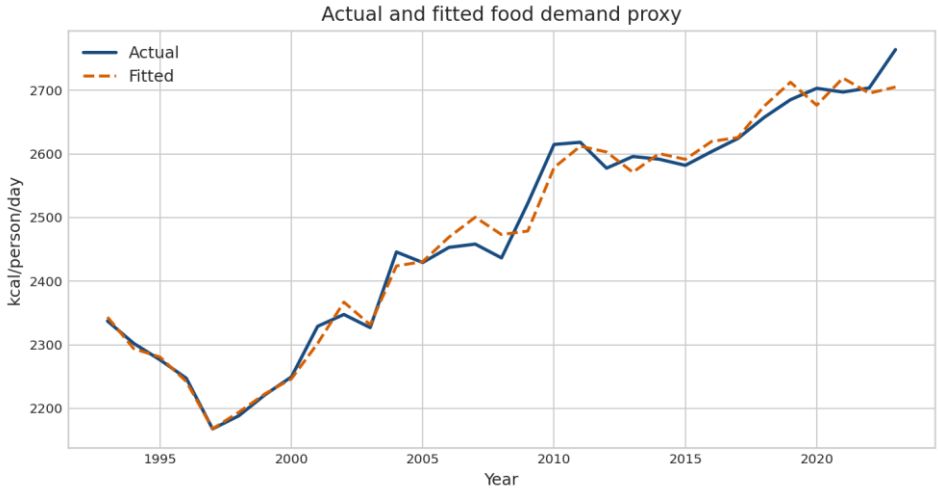


Figure 3. Actual and Fitted Values of the Food-Demand Indicator

Tenth: Robustness Test Using the Food Price Index

The model has been re-estimated using the food price index, instead of the general CPI, from the FAOSTAT Consumer Price Indices database [16], for the period 2000-2023. The food price change elasticity of demand was negative, -0.1870, significant at 10% level and was consistent with the law of demand and probability was 0.0667. Also the error correction coefficient was negative (-0.6035) and significant at 5% level. The shorter time frame of data meant that these bounds were 3.6195 (representing 10%) of the cointegration, and not 5%. The robustness result therefore bolsters the short-run price effect, but cautions against using inferences in the long run.

Applied Synthesis of the Findings

The long run results indicate that although structural dependence on food imports is a good proxy of food supply stability, it may not be associated only with income or prices changes. The lack of statistical significance for the income elasticity does not mean that there are no welfare effects; it means that the change in composition and quality of the consumption-basket that results from an increase in income is larger than the change in calories. The responsiveness of the adjustment rate of 36.1% per year also suggests that food shocks do not just fade away, but last for almost three years. This means that strategic stocks need to

be built, a diversified import base is necessary, domestic production should be supported and the targeting of the social protection network and the Public Distribution System needs to be improved.

Conclusion

1. The food available per person is expected to have experienced considerable fluctuation over the study period in Iraq. This averaged around 2,496.2 kcal/person/day, varying between 2,167.9 and 3,357.2, reflecting the impact of economic and political shocks and changes in food provisioning capacity.
2. The result of the 3 tests showed that none of the variables were I(2), all were stationary at level (I(0)) or stationary after first difference (I(1)). Therefore, the ARDL model can be used to examine the economic relationships.
3. The ARDL(3,2,2,1,1) model had a high coefficient of determination (0.9727) and an adjusted R-squared value. The overall F-statistic was significant at 1% and the model passed serial correlation and heteroskedasticity and ARCH, normality, RESET and stability tests.
4. A bounds test was used to test the cointegration between the food demand and explanatory variables. It is found that the calculated value of F is 4.7614 which is greater than the upper critical bound value at the 1% significance level (4.7061) and hence it is concluded that there exists a long-run equilibrium relationship.
5. The long-run elasticity of food demand with respect to food imports per capita was 0.1267 which was significant at 5% level. The rise in imports was then associated with a rise in food availability per capita of approximately 0.127%, suggesting the structural dependence on external markets to meet food needs.
6. The long run coefficients of the general price index, the real income per capita, and the exchange rate were all not statistically significant in the model selected. It is not that they are not economically important; on the contrary, they were joined in their impact during the study period with the impact of shocks, the shape of imports, and shifting consumption patterns.
7. The error-correction coefficient was significantly negative and highly significant at 1% level, which is - 0.3610. This means that approximately 36.1% of the disequilibrium is rectified annually and shocks take about 2.77 years to realign the system to the equilibrium path.
8. Similarly, the robustness test based on the food price index was negative with short run price response of -0.1870 at 10% significance level. It is in accordance with the law of demand and suggests that a food-specific price index should be more appropriate indicator of consumer price sensitivity than the CPI.

Recommendations

1. Encourage the development of the productivity of key crops and food products to improve the country's food production capacity and reduce post-harvest losses and make food product storage and marketing more efficient, in a bid to gradually reduce the structural dependence on imports.
2. Build up strategic food stocks of vital products with minimum thresholds and a well defined rotation policy; diversify import countries, import routes and lengthy contracts to minimise potential disruptions and fluctuations in global food prices.

3. Make better use of early-warning systems for food prices and incorporate them in trade, stocks and policy decisions; provide cash transfers or targeted assistance programmes for the poor rather than large-scale price support programmes.
4. Align monetary, trade and agriculture policies to stop the transmittal of exchange rate volatility and international inflation into domestic food prices particularly for products with high share of imported goods.
5. Invest in food industries, cold chains, transport and modern storage facilities, especially public and private investments; build capacity of the domestic food producers to respond to the demand through better financing, insurance and extension of agricultural activities.
6. Establish a national food database in an integrated fashion based on cooperation between the Central Statistical Organization and the ministries of planning, agriculture and trade at national level on an annual basis. Quantities, prices, household expenditure, stocks, losses and imports by commodity group and governorate should be included in the database.
7. Conduct additional analysis at food group and commodity level, with the application of AIDS/QUAIDS model and household expenditure and income data; tests for structural breaks and asymmetric price increases and reductions.
8. Update the estimates as official food balance data becomes available for 2024-2025 to enable results to be audited and reproduced without reliance on estimates.

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